Preparation and Testing of the SRF Cavities for the CEBAF 12 GeV Upgrade

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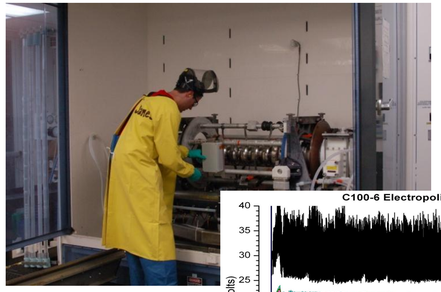
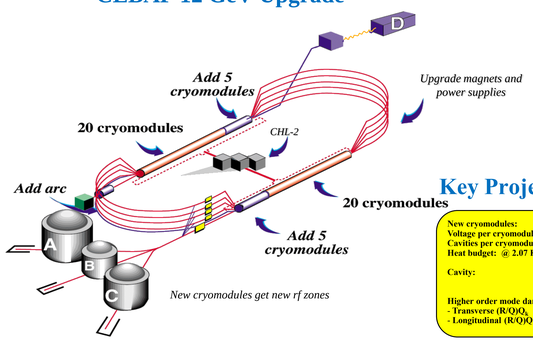
Eighty new 7-cell, LL cell-shaped cavities are required for the CEBAF 12 GeV Upgrade project. In addition to ten pre-production units fabricated at JLab, the full set of commercially produced cavities have been delivered. An efficient processing routine, which includes a controlled 30 micron EP, has been established to transform these cavities into qualified 8-cavity strings. This work began in 2010 and will run through the end of 2011. The realized cavity performance consistently exceeds project requirements and also the maximum useful gradient in CEBAF: 25 MV/m. We will describe the cavity processing and preparation protocols and summarize test results obtained to date.



Exploiting New Electrochemical Understanding of Niobium Electropolishing for Improved Performance of SRF Cavities for CEBAF
C. E. Reece and H. Tian, LINAC10 **THP010**

CEBAF 12 GeV Upgrade

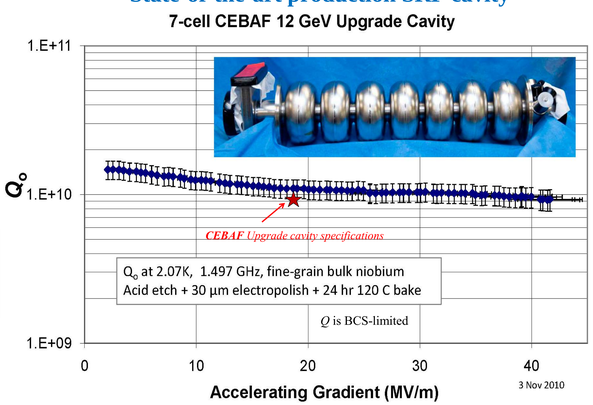


First two cryomodules - installation summer 2011, Eight more CMs in 2012

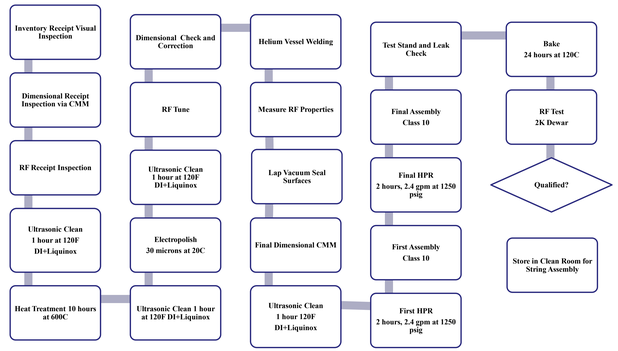
Key Project Parameters

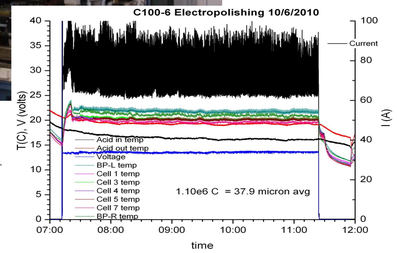
New cryomodules:	10
Voltage per cryomodule:	≥ 108 MV avg.
Cavities per cryomodule	8
Heat budget: @ 2.07 K	≤ 300 W / CM ≤ 29 W / cavity, avg.
Cavity:	1.497 GHz 0.7 m "Low loss" cell shape
Higher order mode damping:	
- Transverse $(R/Q)Q_L$	< 2.4 x 10^{10} Ω/m
- Longitudinal $(R/Q)Q$	< 6.5 x 10^{11} Ω/m

State-of-the-art production SRF cavity

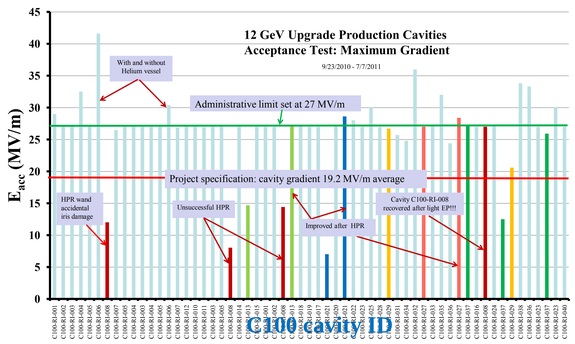


12 GeV C100 Cavity Process Flow

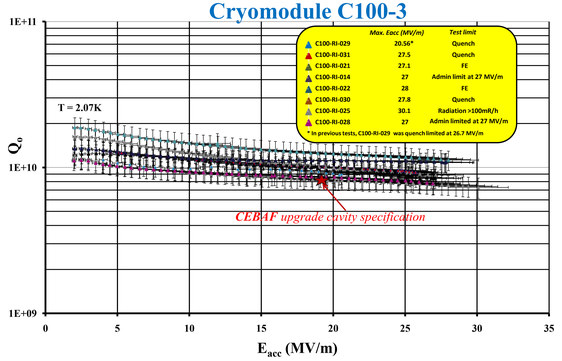




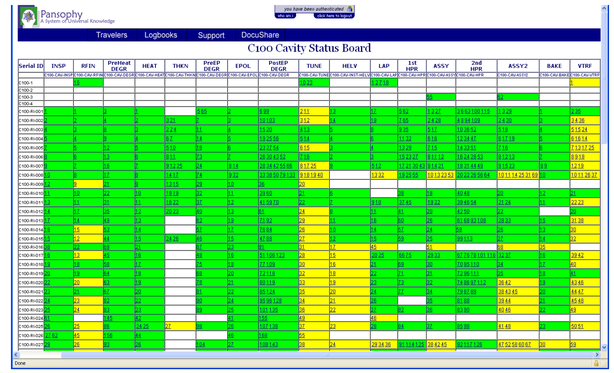
E_{max} of VTA Qualified Cavities for 12 GeV Upgrade



Qualified Cavities for 12 GeV Upgrade Cryomodule C100-3



12 GeV Upgrade Cavities Production tracking system



Production clean room activities

Vertical test Area (VTA): Dewars and control room

C100-1 string assembly

Summary:

- 86/86 cavities received
- 60/86 cavities electro-polished
- 40/86 cavities VTA tested
- 38/86 cavities qualified in helium vessel
- 32/86 cavities = 4 /10 strings completed, ready for #5
- Procedure suite established and tracked
- No SRF cavity performance issues currently open

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